

CONTRIBUTIONS TO THE NATURAL HISTORY OF THE  
BERMUDA ISLANDS.

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The following notes on the zoology of a group of islands but little known to the naturalist are based on personal observations, and on collections made during a brief sojourn on the islands during the past summer, in company with a class of students from the Academy of Natural Sciences. But little systematic work, other than that in the departments of ornithology, ichthyology, and botany, had hitherto been done in this remarkably interesting, and typically oceanic, island group, and it was thought that a more critical survey might bring out facts of general interest to the zoological student, and throw some additional light upon the intricate subject of zoogeography. In the results obtained I have not been disappointed. The exuberance of animal life has yielded much that has proved to be new to the systematist, while certain remarkable peculiarities in the distribution of a number of well-known types of animals open up vistas in geographical distribution which appear to me at present to recede into darkness, and, perhaps, tend to draw only more closely the veil over this mysterious subject.

Much of my time was devoted to an examination of geological features, and, indeed, the special object of the journey was to ascertain, in the light of more recent inquiry, what evidence could be obtained from the Bermudas bearing upon the question of the growth and development of coral islands. The substance of my observations in this field will be presented in a future paper. Only a portion of the zoological results is here published, inasmuch as additional material in certain departments, intended to fill in gaps in the inquiry, has been promised by local collectors.

The specimens noted or described in the following pages were mainly obtained through dredgings, which were carried on as well in the outer water as in the smaller interior sounds and lagoons. As might have been anticipated the greatest profusion of animal life was found on the edge of the growing reef itself, the shoals surrounding the cluster of rocks on the northern barrier known as the North Rock. The wealth of forms occurring here almost transcends belief; unfortunately, the combination of limited time at our command and the state of the weather prevented more than a cursory

examination of this locality, which is made comfortable for collecting and wading during a partial exposure above water of some three hours. All the dredgings were confined to depths within 16 fathoms, which also represents the greatest sounding made by us in the lagoons.

### ACTINOZOA.

The true stone corals of the Bermudas are comprised, as far as we now know, in some twenty-five species, the greater number of which are represented by identical forms in the Bahaman or West Indian seas. The genera thus far indicated are *Oculina*, *Mycedium*, *Astraa*, *Siderastraea*, *Porites*, *Isophyllia*, *Mavandrina*, and *Diploria*. The genus *Madrepora*, one of the commonest of the Bahaman and Floridian corals, appears to be absent. On the south and east side of the island group the outer margin of the growing reef, largely covered by a serpuline and vermetus growth, approaches to within a few hundred feet of the shore, where it breaks the inflowing surf into a white crest. Within the line of these breakers the depth of water is in places as much as ten or twelve fathoms. The brain coral (*Diploria*) and various gorgonians develop here in great profusion, the huge yellow masses of the former appearing almost everywhere at depths of from ten to twenty feet. Vast growths of millepore also cover the shallower bottoms, presenting in the ensemble a wonderful garden of animal development. This profusion of coral growth is, however, surpassed on the north side, where the reef recedes to a distance of some eight or nine miles from the island-shores, enclosing an extensive body of water whose depth is in general about eight or ten fathoms, and more rarely twelve fathoms. Much the same coral growth is indicated here as on the south side, the large brain corals preponderating by their masses. While, probably, the greatest profusion of animal life is really met with on the actual edge of the growing reef, this does not appear to be the case with the corals themselves. At any rate, I was unable to satisfy myself that there was any marked difference to be observed between the marginal growth and that which extends gradually backward from the margin into deep water. Indeed, as far as the brain-corals themselves are concerned, it appeared to me that their largest masses were to be found some distance within the bounding reef, and consequently beyond the breaking action of the surf. This condition is again shown in the comparatively quiet and sheltered waters of Castle Harbor, where portions of the platform-bottom may be said to constitute one almost connect-

ed mosaic of huge Diplorias. In so far, therefore, the Bermudas differ from the greater number of coral islands, in which, as is commonly stated, there is a marked deficiency in the coral growth within the bounding area, and an equally marked luxuriance on the crest and outer slope of the reef.

In most places the largest corals do not come nearer than a foot or two feet of the surface of the water, the massive brain-corals rarely appearing in water of less depth than five or six feet. But in the shallows off the North Rock we found *Porites astravoides* almost at the surface in low water, and just off the entrance to Harrington Sound, on the north shore, *Siderastrea galaxea* was covered by only about two inches of water. The borders of Harrington Sound are largely overgrown with species of *Isophyllia*, which likewise approach to within a short distance of the surface. In the greater depths of the Sound we found only *Oculina*, down to ten fathoms, the dredge-net being frequently caught and reversed by their ramose stems; beyond ten fathoms the dredge usually came up empty.

The following species were obtained by us:

*Mycedium fragile*, Dana.

Two specimens. North Rock?

*Oculina diffusa*, Lamk.

Harrington Sound.

*Oculina varicosa*, Lesueur.

Harrington Sound.

*Oculina pallens*, Ehrenberg.

Harrington Sound.

I feel satisfied that this species is identical with the preceding, the same stock bearing what might be considered to be typical representatives of both forms.

The amount of variation in the disposition of the calyces, as well as in their individual shape, is very great in this genus, and I am by no means sure that two or three of the other forms of *Oculina* here enumerated represent anything more than varietal modifications. Pourtalès, in his illustrations of the corals of the Florida reefs (Mem. Mus. Comp. Zoology, VII, plates I and II) correctly refers, it seems to me, both types to a single species (*A. varicosa*.)

*Oculina speciosa*. Edwards and Haime.

Harrington Sound.

*Oculina recta*, Quelch.

One specimen, from Harrington Sound, which agrees in the special characters of the species from St. Thomas (Quelch, Challenger

Reports, Zoology, XVI, p. 51.) The species does not appear to have been hitherto observed in the Bermudian waters.

*Oculina coronalis*, Quelch.

Harrington Sound. First described from the Bermudas (Challenger Reports, Zoology, XVI, p. 49.)

Quelch, in his report on the reef-building corals of the Challenger (*op. cit.*, pp. 9 and 49), enumerates as an additional member of the Bermudian fauna the *Oculina Bermudiana* of Duchassaing and Michelotti. I have been unable to find anything in the description or figures furnished by these authors (*Supplément au Mémoire sur les Coralliaires des Antilles*, p. 162, pl. IX, figs. 1, 2—*Memorie della Reale Accad. Scienze di Torino*, Ser. Sec., XXIII, 1866) to distinguish their species from *Oculina speciosa*, nor does it appear to me to be distinct. The characters upon which the form is separated are exceedingly trivial, and well within the amount of variability which is presented by individual specimens of nearly all the species of *Oculina*. I further believe that *O. coronalis*, and possibly also *O. recta*, will have to be united with *O. speciosa*.

*Isophyllia australis*? Edwards and Haime.

Three specimens from the North Rock, doubtfully identified with this species.

*Isophyllia fragilis*? Dana.

I am unable to satisfy myself as to the positive existence of this species in Bermuda, although Quelch refers to a single specimen having been obtained there by the Challenger party. This authority doubtfully refers one of the forms figured by Pourtalès (*op. cit.*, pl. VII, fig. 3) as *I. dipsacea* to Dana's species, but from an examination of a number of Bermudian specimens which agree absolutely with Pourtalès's figure I am fairly convinced that this identification is incorrect. The specimens do certainly not agree sufficiently with Dana's description, and if they are not the types of a distinct species, then they represent probably only a certain phase of development of *I. dipsacea*, as indicated by Pourtalès.

*Isophyllia dipsacea*, Dana.

Three specimens, from Castle Harbor.

*Isophyllia strigosa*, Duchassaing and Michelotti.

A number of specimens, from Harrington Sound, which agree with the description of this species. I am doubtful as to the species being distinct from *Isophyllia dipsacea*; possibly, however, some of

the varieties (so-called) of the latter species figured by Pourtalès are really members of this species. Its principal distinguishing characters appear to be the thinner and more irregular septa, and the terminal cleft that indents or separates the septa of opposing calyces where they cross the common wall. It also presents a more bristling appearance than *I. dipsacea*.

**Isophyllia Guadeloupensis**, Pourtalès.

One specimen. This appears to be a good species, although by Queleh it is referred to *Isophyllia strigosa*.

In addition to these forms Queleh enumerates *Isophyllia (Symphyllia) marginata*, *I. cylindrica*, and *I. Knoxi*, all of Duchassaing and Michelotti, as having been obtained at the Bermudas, but I have failed to detect any specimens among our collections which can be confidently referred to these species. On the other hand, I find one or two forms which I have not yet been able to identify with any described forms.

**Siderastræa galaxea**, Ellis and Solander.

Abundant on the shoals of Gallows Island, near the mouth of Flatts Inlet, where the colonies come to within about two inches of the surface; also on the borders of Harrington Sound.

**Porites clavaria**, Lamk.

Two specimens, dredged in Harrington Sound.

**Porites astræoides**, Lamk.

We found this species very abundantly along the outer reef, especially on the flats of the North Rock, where it is the dominant form of coral. The species appears to have been overlooked by the Challenger party, and indeed, the only reference that I have been able to find indicating the occurrence of this common West Indian form among the Bermudas is contained in Mr. Rathbun's list of the species of Porites in the United States National Museum (Proc. U. S. National Museum, 1887, p. 354).

**Mæandrina labyrinthica**, Ellis and Solander.

Three specimens, from the North Rock.

**Mæandrina strigosa**, Dana.

This form is represented by large, sub-globose specimens, one of which, obtained through purchase, and probably from Castle Harbor, has an exceedingly attenuated base of attachment. The

corallum is thus openly turbinate, or even pediculate, and exhibits in regularly scalariform outline the successive stages of outward development.

*Diploria cerebriformis*, Lamk.

This species is exceedingly abundant in the shoals lying to the leeward of the marginal reef, where its huge hemispherical or reniform masses of bright orange, measuring as much as four or five feet in diameter, can be distinctly seen through the transparent waters at depths of from six to fifteen or twenty feet. I cannot say how much further down the species extends. It is equally abundant in Castle Harbor, where it is largely instrumental in building out the shore-platform which, at a moderate distance from the shore, descends vertically into deeper water. When attached by a contracted base, the brain-coral may be readily removed from its moorings; but where the base is largely co-extensive with the under-surface of the corallum the difficulties of removal are very great, necessitating much undercutting with a chisel. The largest specimen obtained by us measured about 28 inches across; our efforts to dislodge a specimen about four feet in diameter proved unsuccessful.

*Diploria Stokesi*, Edwards and Haime.

We obtained a number of specimens of this species in Castle Harbor and through presentation; for the latter my thanks are due to Miss A. Peniston, of Penistons. The habitat of the species, as far as I am aware, had not hitherto been noted. Edwards and Haime in their description of the species (*Hist. Nat. des Coralliaires*, II, p. 403, pl. D, fig. 3) state "*Patrie inconnue.*" I believe it may be assumed that this species is the form described and figured by Knorr as *Madrepora labyrinthiformis* (*Deliciae Naturæ Selectæ*, I, p. 18, Pl. A 4, fig. 1). In our collections we have a closely related, and possibly identical species, which assumes a ring form, and in which the peculiar calycular hollows of *D. Stokesi* run out into parallel transverse grooves on the inner side of the ring.

### ALCYONARIA.

The gorgonians are abundant in the waters inside of the bounding reef, whence nearly all our specimens were obtained. A few were nipped up on the south side of Castle Harbor, and at the passage way conducting from the north into that body of water.

*Rhipidogorgia flabellum*, Valenciennes.

The purple variety of this species is abundant more particularly in the northern waters, both near the outer reef and on the shallows known as Devonshire Flats. We failed to obtain any of the yellow forms, and I am not positive that this variety has ever been found at the Bermudas.

*Gorgonia (Plexaura) purpurea*, Pallas.

*Gorgonia (Plexaura) flexuosa*, Lamouroux.

This species, of which we obtained several specimens, is, I believe, without doubt the *Gorgonia anguiculus* of Dana (U. S. Exploring Expedition, Zoophytes, p. 668). It is referred to under Lamouroux's name as a member of the Bermudian fauna in Dana's "Corals and Coral Islands," p. 114, 1872.

*Gorgonia (Plexaura) homomalla*, Esper.

*Gorgonia (Plexaura) multicauda*, Lam.

(*Gorgonia crassa*, Ellis and Solander.)

(*G. vermiculata*, Edwards and Haime.)

The exact limitations and synonymy of this species are difficult to make out, but as far as my studies have permitted me to analyze the forms above indicated from the rather insufficient or deficient descriptions that have been furnished by their authors, they appear to represent an identical form. As such as I have accordingly referred them in this list.

*Gorgonia (Plexaura) dichotoma*, Esper.

A single specimen, measuring about a foot and three-quarters in height, with the main stems somewhat over a half-inch in diameter.

*Gorgonia (Eunicea) pseudo-antipathes*, Lam.

One much branched specimen, and another, slightly differing, which appears to belong to the same species.

*Pterogorgia acerosa*, (?) Pallas.

A single specimen of a large *Pterogorgia*, entirely stripped of ctenenchyma, and measuring about two and a-half feet in height, was obtained through purchase at the Crawl. The axial skeleton is yellowish, or of the color of earth. The terete branches are much more broadly spreading than in *P. setosa*, and unite into a common basal stalk which is upwards of two inches in thickness. The pinnules are very numerous, exceedingly slender, and pendulous, giving to the whole organism the decided appearance of a weeping-willow.

I have not been able to satisfy myself as to the exact affinities of this species. It appears to differ broadly from the common purple sea-feather of the West Indies, and does not have the depressed branches which are assumed for Esper's *Pterogorgia acerosa*. It is, however, with little doubt one of the forms that are included by Pallas in his *Gorgonia acerosa* (*Quercus marina Theophrasti*), and may be the one that is referred to by Milne-Edwards as *Pterogorgia Sloanei*.

Of the species of gorgonians above enumerated Dana indicates *Rhipidogorgia flabellum*, *Gorgonia flexuosa*, *G. homomalla*, and *G. crassa* as coming from the Bermudas ("Corals and Coral Islands," p. 114). I find no mention in any more recent work of the occurrence there of either *Gorgonia pseudo-antipathes* or *G. dichotoma*. On the other hand, we failed to obtain the *Pterogorgia Americana* mentioned by Dana.

#### ZOANTHIDÆ.

Of the zoanthoid forms of actinians we collected three species, *Palythoa* (*Corticifera*) *glareola*, Lesueur, *P. ocellata*, Ellis and Solander, and a species of *Zoantha*, closely related to *Z. sociata*, but possibly new. The first of these species was found in large encrusting masses at the North Rock, partially exposed at low water. The glary white or yellowish crusts were nearly half an inch in thickness. *Palythoa ocellata* also occurs, but more sparingly, at the same locality; on the western exposure of Gallows Island, at the entrance to Flatts Inlet, it was much more abundant, forming large patches in association with *Siderastraea galaxea*. The species of *Zoantha* was sparingly developed off Gallows Island, but in one or more rock-hollows in Tucker's Town Bay, Castle Harbor, the bright green colonies of this beautiful polyp were plentiful.

#### ECHINODERMATA.

##### HOLOTHURIA.

The animals of this order are in places excessively abundant; indeed, excepting the corals, they may be said to constitute the most distinctive feature of the fauna of the sand bottoms. Where other forms are apparently entirely absent, the black masses of the great *Stichopus* stand out in prominent relief over the white bottom. Motionless, seemingly, during the greater part of their existence, these singular creatures present the appearance of big black blotches on the sand, of which they consume, whether for nourishment or

otherwise, vast quantities. All the individuals that were opened had their intestinal canal, or more properly, their entire digestive tracts, completely choked with calcareous particles.

The following are the species of holothurians observed by us, only one of which, I believe, had hitherto been noted from the Bermudas :

**Holothuria Florida**n*a*, Pourtalès. (*Holothuria atra*, Jäger.) Pl. 14, figs. 6, 6*a*, 7, 7*a*.

I identify with this species five small individuals of an olive-green color which were obtained in Castle Harbor, and which in a general way agree with the description of the species given by Pourtalès (Proc. American Assoc., 1851, p. 12). Unfortunately, no figure accompanies the description, and that part which pertains to the calcareous bodies embodied in the skin is too vague to permit of specific determination. Selenka (*Zeitschrift für wissenschaftliche Zoologie*, xvii, p. 324, 1867) has supplemented the original description with further details of structure and with illustrations of the spicules, which practically leave no doubt in my mind that the Bermudian forms, even though differing somewhat from the type described by Pourtalès, are really that species. I have examined the spicular bodies of all the individuals, and find that they exhibit considerable variation (Pl. 14, figs. 6, 6*a*, 7, 7*a*). This is especially noticeable in the form of the stools. I really doubt if very much dependence can be placed upon these bodies as furnishing characters for specific distinction. I also find a certain amount of variation in the number of tentacles. Thus, while four of the individuals have the normal number of tentacles, 20, one has only 10, although in all other essentials of structure it agrees with the remaining four. The dorsal surface is distinctly papillate. The elongated yellowish pedicels of the ventral surface are irregularly distributed, as stated by Selenka, and I could not determine any strictly linear disposition such as is indicated by Pourtalès.

The largest specimen measures about two and a half inches.

Semper, Ludwig, and Lampert (*Die Seewalzen*, Semper's *Reisen im Archipel der Philippinen*, 1885, p. 86) identify this species with the *Holothuria atra* of Jäger (1833), whose range is made to be practically cosmopolitan—extending from the Radack Archipelago and the Sandwich Islands to Adelaide, Zanzibar, the Red Sea, and the

West Indies—but on this point I can offer no satisfactory evidence, never having had an opportunity to examine authentic specimens of Jäger's species.

**Holothuria captiva**, Ludwig. (Pl. 14, figs. 4, 4a)

Two individuals, agreeing with the species described by Ludwig from the Barbados.

**Holothuria abbreviata**, n. sp. (Pl. 14, figs. 5, 8, 8a.)

Among the smaller forms of holothurians is one which in many of its characters agrees most closely with Ludwig's *H. captiva*, but yet differs to such an extent as to compel me to recognize it as a distinct species. Indeed, by many systematists it would probably be made the type of a distinct sub-genus or genus. The distinguishing peculiarity is the abrupt truncation of the body, which carries the vent on the dorsal surface, immediately about the extremital border. In the single specimen before me I could determine only 17 tentacles, with as many tentacular vesicles, and but a single Polian body. A large Cuvierian bundle is present. The pedicels are arranged ventrally in three more or less distinct rows. Color olive green. Length about two inches.

The stools, buttons, and fenestrated plates of the pedicels are figured on plate 14. It will be seen that in general they bear a close resemblance to those of *Holothuria captiva*, but the rounded summits of the stools serve readily to distinguish them from the somewhat similar, but more strictly castellated, bodies of the other species.

#### SEMPERIA.

**Semperia Bermudensis**, n. sp. (Pl. 14, figs. 2, 2a, 3.)

Body cylindrical, spindle-shaped, tapering almost equally to both extremities. Tentacles 10, of which 4 are shorter than the remaining 6; pedicels crowded, arranged in five broad rows, and scattered over the interambulacral areas; two genital bundles, with very numerous non-divided, and greatly elongated filaments; two Polian vesicles; two long respiratory trees. Color greyish white, minutely speckled with brown; five narrow longitudinal brown bands separating the ambulacral areas. Length about  $3\frac{1}{2}$  inches.

Calcareous bodies consisting of baskets, knotted and smooth buttons, and perforated more or less circular disks; pedicels with fenestrated plates. Calcareous ring with long back processes for the attachment of the powerful retracted muscles.

One specimen, from the north shore about a half-mile west of Flatts Village.

I first mistook this species for the *Semperia (Colochirus) gemmata* of Pourtalès (Proc. Amer. Assoc., 1851, p. 11), described from Sullivan's Island, coast of South Carolina, but the more exact descriptions and figures of that species given by Selenka and Lampert convince me that it is quite distinct. Both species are of a greyish-white color, but no mention is made by either of the authors above quoted of the existence in the Carolinian form of the five longitudinal brown bands which extend over the entire length of the Bermudian species. Apart from this, *Semperia Bermudensis* differs in the disposition of the tentacles, the greater number of Polian vesicles, and the character of the spicular buttons, which are in the greater number of instances strongly knotted. The posterior processes of the calcareous ring appear also to be much more elongated.

From *Semperia (Cucumaria) punctata*, described by Ludwig from the Barbados (*Arbeiten aus dem zoolog. zootom. Instituts in Würzburg*, ii, 1875, p. 82) the species differs, apart from the general scheme of coloring—tentacles as well as body—in the different disposition of the tentacles (9 equal in *S. punctata*, according to Ludwig), the smaller number of Polian vesicles (5 in *S. punctata*), and in the much greater number of filaments composing the genital bundles. The vent does not appear to have been rayed.

Ludwig states that there are in his species no calcareous setae about the anal aperture, whereas Lampert just as positively asserts that they are present (Semper, *Philippinen*, 1885, p. 152). None such were detected in the Bermudian form.

#### STICHOPUS.

*Stichopus diaboli*, n. sp. (Pl. 15, Figs. 1, 1a, 1b, 2.)

Body stout, more or less quadrangular, flattened ventrally, and bearing two rows of prominent marginal, wart-like, tubercles; sometimes two additional rows of minor tubercles are noticeable on the lateral margins of the dorsum. Tentacles 20, unequal. Dorsal papillae scattered, not prominent, leaving the surface nearly smooth. Pedicels and papillae on ventral surface arranged in three broad bands, which are more or less distinct for the entire length of the body, but most distinct near the extremities; numerous in each transverse row.

The body-cavity is largely occupied by the greatly developed, and finely dissected, respiratory apparatus, and by the loops of the

variously branched genital organs, which are disposed in two great bundles. Tentacular vesicles present. Two Polian vesicles. Calcareous ring with long back processes.

Calcareous bodies in the form of stools very numerous (Pl. 15, fig. 16.) C-shaped bodies very scanty, and possibly in some cases entirely wanting.

Color black, somewhat more intensely so on the dorsal surface, becoming Vandyke brown or chocolate in alcohol.

Length, about one foot; width of corresponding animal about three inches.

Abundant over the sandy floor of the entrance to Harrington Sound, opposite Flatts Village, in Harrington Sound, and in Castle Harbor, whence it was obtained in several of our dredgings.

I have little doubt that this species is the dark-brown form which is referred to by Théel as having been obtained by the officers of the Challenger at the Bermudas, and which is doubtfully referred by that authority to Semper's *Stichopus Haytiensis* (Report on the Holothuroidea, Challenger Reports, Zoology, XIV, p. 162.) But a single specimen appears to have been obtained, which when examined was too deformed to permit of positive specific determination. I cannot agree with Théel's determination. Apart from the differences which Théel himself points out, is the great difference in coloring. Semper (*Reisen, Philippinen, Holothurien*, 1868, p. 75) states that his species is dark chocolate-brown, blotched with yellow spots, which form five longitudinal bands, corresponding to the interradii. No such coloration is visible in our species, although probably we observed as many as a hundred individuals, all of which were uniformly black. Semper's description of the coloring of *Stichopus Haytiensis* is restated by Lampert.

*Stichopus xanthomela*, n. sp. (Pl. 14, fig. 1; Pl. 15, fig. 3.)

Body stout, flattened ventrally, and bearing on the basal margin two rows (one row on each side, as in the preceding species) of prominent wart-like processes. Tentacles 18, unequal, whitish or gray, edged with brown. Dorsal papillæ fairly prominent, scattered. Pedicels on ventral surface crowded, arranged in three longitudinal series, five to eight, or more, in each transverse row.

Body-cavity, as in the preceding, largely occupied by the respiratory tree and the double genital bundle, the filamental processes of the latter much finer than in *S. diaboli*. Tentacular vesicles present. One (?) Polian vesicle.

Calcareous bodies, in the form of stools (Pl. 15, fig. 3), very numerous. C-shaped bodies scarce, in the form of broadly-opened calipers. Ground-color reddish-yellow, irregularly blotched with black or very dark brown. The spots on the ventral surface more or less coalescent in the median line, forming there a broad longitudinal band, or entirely united to form a uniformly dark-colored base; on the back, united into two irregularly ramifying or wandering bands.

Length of longest specimen about ten inches; width about two and a-half or three inches.

The same habitat as that of the preceding species, although apparently much less abundant.

I strongly suspect that this is the form which Théel, in his report on the Challenger holothurians (*loc. cit.*, p. 159), identifies with *Stichopus Möbii* (Semper), one specimen of which, "rather deformed and compressed" when examined by Théel, was obtained at the Bermudas. I assume the identity in this case, as well as in that of the preceding species, on the ground that the two species here described are the characteristic forms of the archipelago, and it is barely possible that they could have escaped the attention of the Challenger people. But the identification with Semper's species appears to me to be erroneous. The resemblance to *Stichopus Möbii* appears to rest almost wholly upon the form of the spicules, which are largely similar in many very distinct forms of *Stichopus*, and in a general scheme of coloring. But Semper distinctly states (*Holothurien*, *loc. cit.*, p. 246) that the characteristic spots are almost wholly wanting on the ventral surface, and no mention is made of their occurrence there by Lampert, in his revision of the species of the genus (*op. cit.*, p. 108.) Moreover, Semper affirms that the body is devoid of wart-like tubercles, whereas such are quite prominent in the Bermudian form, although not as prominent as in *Stichopus diaboli*. Théel, however, makes no mention of the occurrence of tubercles in his single specimen, but probably through contraction in alcohol their existence had been effaced. The number of pedicels in each transverse row seems also to be much more numerous in the Bermudian species than in *Stichopus Möbii*.

Another apparently related form is *Stichopus errans* of Ludwig (*Arbeiten zoolog. zootom. Inst., Würzburg*, 1875, p. 97), described from a specimen in the Hamburg Museum, reputed to have come from the Barbados. But in this species there appear likewise to be no

lateral tubercles, nor is the coloring like that of our species, although in this regard there may be considerable variation. The number of tentacles is stated by Ludwig to be 19, and their color yellow. The form from the Barbados which is somewhat doubtfully referred by Théel (*loc. cit.*, p. 191) to Ludwig's *S. errans* would seem to be more nearly related to the Bermudian species.

#### ASTEROIDEA.

We obtained but a single species of star-fish on the Bermudian coast. This is the *Asterias Atlantica* of Verrill, a form which had already been previously noted from the Bermudas (Trans. Conn. Acad. Sciences, i, p. 368), and whose range extends to the Abrolhos Reef, Brazil. With very few exceptions the rays were either six or eight in number, and of the total number of individuals examined I believe that not over two had five arms. The species exhibits a marked want of constancy in ornamentation and coloring, the dorsal spines being in some cases acute, while in others they are terminated by a minute bead; again, while the maculation is brown in some individuals, in others it is blue, or of both colors combined.

*Asterias Atlantica*, Verrill.

Common in the entrance to Harrington Sound, opposite Flatts Village—under stones; dredged in Harrington Sound.

*Ophidiaster Guildingii*, Gray.

This species, which was first described from St. Thomas, is apparently a member of the Bermudian fauna. A single specimen, marked as having been collected by Mr. Janney in the Bermudas, is in the possession of the Academy of Natural Sciences.

#### OPHIUROIDEA.

Six species of ophiurians were obtained in our dredgings and under rock shelters, the greater number of which, as far as I am aware, had not hitherto been reported from the Bermudas. For a critical examination and review of the species I am indebted mainly to my assistant, Mr. J. E. Ives, who has made a careful study of all the species in the collections of the Academy of Natural Sciences. From an examination of many of these forms I feel satisfied that too much dependence should not be placed upon the constancy in minute details of either the form or relative size of the arm plates and their appendages, nor upon an exact scheme of coloration. These characters, and others that may be added, which have been

drawn in very close limits by Mr. Lyman in his several memoirs, vary materially within the limits of the same individual, and render the discrimination of species which have been most "elaborately" defined as to exact lengths and breadths of the arm-shields and oval plates, the precise form and number of the arm spines, etc., a matter of almost hopeless possibility.

**Ophiocoma crassispina**, Say.

One specimen, taken at low water from the North Rock, which agrees perfectly with the species described by Say from the coast of Florida (Journ. Acad. Nat. Sci., Phila. v, p. 147). This species is generally considered to be identical with the *Ophiocoma* (*Ophiura*) *echinata* of Lamarck, but I am disposed to consider this identification erroneous, unless, indeed, several distinct forms, as has been averred by Müller and Troschel (*System der Asteriden*, 1842, p. 98), were included by Lamarck in his species. Two distinct forms, closely related to each other, certainly do occur in the West Indies, one of which, with more blunt arm spines, is clearly Say's species, while the other, with more elongated arm spines, and much less stoutly developed uppermost spine, more nearly corresponds to the general type of Lamarck's species.

**Ophiocoma pumila**, Lütken.

A fragmentary specimen; exact locality unknown. This species had been recorded by the Challenger from Bermuda.

**Ophiostigma isacantha**, Say.

Two very young specimens, dredged in Harrington Sound.

**Ophiactis Krebsii**, Lütken.

*O. Mülleri*, Lütken?

Two very young specimens, dredged on the north shore between Bailey's Bay and Shelly Bay, which manifestly belong to one or the other of the above species, although partaking of the characters of both. They agree with *O. Krebsii* in having a lobe to the outer edge of some of the upper arm plates, and in the banded character of the arms, while they differ from that species in having but four arm spines. In this respect they agree with *O. Mülleri*. Possibly the two species are only varieties of the same form.

**Ophionereis reticulata**, Lütken.

Very abundant at low tide in the rock shelters of Shelly Bay; also under stones at the entrance to Harrington Sound.

*Ophiomyxa flaccida*, Lütken.

One specimen, dredged in Bailey's Bay.

#### ECHINOIDEA.

The number of species of echinoids observed by us is six, of which five had already previously been ascribed to the archipelago; *Cidaris tribuloides*, as far as I am aware, had not hitherto been collected—at any rate I have been unable to find any mention of its occurrence there. One species, *Mellita saxiforis*, we did not ourselves collect, the specimens in our possession having been kindly donated to us by local collectors.

*Cidaris tribuloides*, Bl.

Fairly abundant among the coral shelters of the North Rock.

*Diadema setosa*, Gray.

This species, one of the gems among sea-urchins, is exceedingly abundant in the flats about the North Rock, where, in magnificent contrast to the wealth of color by which it is surrounded, its ebony-black masses stand out in prominent relief from the coral shelters which it inhabits. All the individuals occupied recesses in the coral growth, which they had by some means probably managed to keep open. It seems hardly likely that they should have crept into these shelters after they had been already formed, and that the association is one of mere selection. It is a noteworthy fact that while most of the animal forms inhabiting this portion of the growing reef were brilliantly colored, harmonizing with, and shielding, one another by their party tints of red, yellow, purple, and green, these urchins were alone conspicuous by the absence of any such protective cloak; but just in their case no protective guise in the form of coloring would be needed, inasmuch as these animals are abundantly able to shield themselves by means of their extremely attenuated spines.

This species is also abundant in the moderately deep water that lies within the reef border.

*Hipponoë esculenta*, Leske.

North Rock, and the deeper water within the growing reef.

*Echinometra subangularis*, Leske.

Several specimens from the flats about the North Rock. There is a certain amount of variation in the coloration of the spines, which ranges from olive or sea-green to purple.

*Toxopneustes variegatus*, Lamk.

We found this species very abundantly in Harrington Sound, where it rarely escaped being hauled up in our dredge. It seems to frequent the calcareous bottom to a depth of 10–12 fathoms, or even more. Probably the species is equally abundant elsewhere.

*Mellita sexforis*, Agassiz.

As before remarked, we did not ourselves obtain any specimens of this species. It is said to be abundant along the calcareous bottoms of some of the inlets, as, for example, opposite Flatts Village.

## CRUSTACEA.

For the following notes on the Crustacea I am principally indebted to Mr. Witmer Stone, one of my assistants on the trip, who has made a careful study of all our specimens, as well as of the allied and identical species contained in the collections of the Academy of Natural Sciences. In the case of in any way doubtful forms I have personally satisfied myself as to the determinations, and particularly in cases where the geographical range appeared to indicate possible or probable error. The occurrence in the Bermudas of a number of what had hitherto been considered to be distinctively Pacific or Old World types, as for example, *Palemonella tenuipes* (Sooloo Sea), *Palemon affinis* (Pacific), *Penæus velutinus* (Pacific)—may be considered positive, even though it be opposed to the common facts of zoogeography. But this anomaly in distribution is again repeated among the mollusca, as will be seen in the enumeration of species in a future paper.

The total number of species here enumerated is not very large, but yet it is considerably in excess of the number published in any previous paper, probably one-half of the species being now for the first time credited to the Bermudas. The species of some of the remaining groups—the Isopoda, Amphipoda—still await analysis and determination.

## BRACHYURA.

*Microphrys bicornutus*, Latr.

Three females and one male, collected on the beach at the entrance to Harrington Sound.

*Mithraculus hirsutipes*, Kingsley.

Two males and one small female, which agree in every way with the description of the species given by Kingsley (Proc. Bost. Soc. Nat. Hist., 20, p. 147), except in the number of teeth on the fingers,

a character which appears to be very variable. The three individuals differ in this respect among themselves.

**Actæa setigera**, Milne-Edwards.

One male dredged off Shelly Bay. The individual differs from the description given by Milne-Edwards (*Nouv. Arch. du Mus. d'Hist. Nat.*, i, p. 271, pl. xviii, fig. 2) in having the color of the outside of the hands red, instead of black. It however agrees precisely with specimens attributed to Milne-Edwards' species in the collections of the Academy, and labeled as coming from the Florida reefs. The species has also been recorded from Cuba.

**Panopæus Herbstii**, var. **serrata**, De Saussen.

Numerous small specimens, both male and female, from under stones on the beach of St. George's Causeway, and at the mouth of Harrington Sound. The specimens vary greatly in color, some being very light, others dark brown, while a few are reddish; otherwise they are identical in structure.

The species, described in the *Hist. Nat. du Mexique et des Antilles* (*Crustac.*, p. 16, pl. 1, fig. 7), had previously been recorded from the Bermudas.

**Lobopilumnis Agassizii**, Stimpson.

One small male, agreeing well with Stimpson's description (*Bull. Mus. Comp. Zool.*, ii, p. 142) except in that it lacks the subhepatic spine. Recorded from Bermuda and Florida.

**Neptunus hastatus**, L.

(*N. dicanthus*.)

Two small males.

**Geocarcinus lateralis**, Frem.

Numerous large specimens, from the banks and fields near the south shore. We found them specially abundant near the locality known as Spanish Mark or the Chequer Board, and again not far from Peniston Pond. The burrows in places extend diagonally three or four feet, or even more, beneath the surface, and the animals, rapidly retreating into these, are frequently difficult of capture.

This is, doubtless, the species that is referred to by Willemoës Suhm in the Challenger narrative as *Gecarcinus lateralis*, and is apparently the *G. lagostoma* (?) described by Miers in the systematic portion of the Challenger Reports (*Zoology*, XVII, p. 218), in so far as this description applies to the single Bermuda specimen.

**Nautilograpsus minutus**, L.

One small specimen dredged off Shelly Bay.

**Grapsus maculatus**, Catesby.

One large female, and numerous empty shells from Harris's Bay, south shore.

**Pachygrapsus transversus**, Gibbes.

Numerous specimens, including ovigerous females; very abundant on the rocks about the mouth of Harrington Sound, and also on the Pigeon Rocks, Bailey's Bay.

Recorded from Florida, West Indies, Australia.

**Cyclograpsus integer**, Milne-Edwards.

One small female. Species recorded from Brazil and Florida.

**Goniopsis cruentatus**, Latr.

One female, from the mangrove swamp of Hungary Bay, south shore. Although the species was very abundant at this locality we only succeeded in catching a single individual. The mangrove crab, or "mangrove climber" as the animal is sometimes called, burrows among the thickets of mangrove stems and roots, up which it not infrequently climbs to a height of several feet. The great similarity existing between its coloring and that of the bright and partially withered leaves of the mangrove, especially in the shades of yellow and red, renders the animal difficult of detection, and often at a distance of only a few feet, buried among the fallen leaves, these agile creatures escaped observation, even when attentively sought after. We have here one of the most remarkable instances of protective coloring, or semi-mimicry, with which I am acquainted.

**Sesarma cinerea**, Bose.

Numerous specimens, from the beach of Flatts Village. The species was seen almost everywhere scampering over the rocks.

**Calappa fiammea**, Herbst.

A single male individual obtained through purchase. Species previously recorded from the Bermudas.

## ANOMURA.

**Petrolisthes armata**, Gibbes.

Five specimens, obtained on the beach of Flatts Village, appear to be identical with the form described under this name from Florida, (Proc. Amer. Assoc., 1850, p. 190.)

**Cenobita Diogenes**, Latr.

A number of living specimens obtained at Wistowe, opposite Flatts Village, and kindly presented to us by Miss Edith Allen, daughter of the American Consul. Most of the animals are still living (October), and apparently flourishing, three months after their capture. The shells occupied by the largest individuals are those of *Natica catenoides*.

**Calcinus obscurus**, Stimpson.

Several specimens obtained on the beach of Flatts Village.

**Clibenarius (Pagurus) tricolor**, Gibbes.

Numerous on the beach of Flatts Village and at the St. George's Causeway; under stones, etc.

## MACRURA.

**Palinurus Americanus**, Lamk.

We observed a number of specimens of the large Bermuda crayfish, but unfortunately obtained none. I am unable, therefore, to state positively if the species is correctly referred, but in all probability it is the same as the common West Indian form.

**Scyllarus sculptus**, Milne-Edwards.

One specimen, purchased at the Crawl, which agrees with Milne-Edwards' description (*Hist. Nat. des Crust.*, ii, p. 283) and Lamarek's illustration in the *Encyclopédie*, pl. 320. The locality of the original specimen appears to have been unknown, nor have I been able to obtain data regarding this species from any of the later writers, by many of whom it is entirely ignored.

**Alpheus avarus**, Fabr.

(*A. Edwardsii*, Audouin.)

(*A. Bermudensis*, Spence Bate.)

A series of some twenty specimens collected at the same locality shows considerable variety of form. The smaller specimens are evidently the *A. Bermudensis* of the Challenger Reports, while the larger ones, agreeing with these in the structure of the head, etc., more nearly approximate in the configuration of the hand *A. avarus* and *A. Edwardsii*, the former a common Old World species, and the latter, a species described from the Cape Verde Islands. Our series contains what might be considered undoubted representatives of all three (so-called) species, showing all the gradations that unite or separate the forms from one another. Hence, I am constrained

to look upon them as mere varietal forms of a single species, the *Alpheus avarus* of Fabricius. The older the specimens, the more deeply grooved is in most cases the hand.

**Alpheus minus**, Say.

A number of species taken from sponges and tunicates collected in Harrington Sound. All the individuals were of small size, measuring rather less than an inch in length, although the females were abundantly provided with eggs.

**Alpheus formosus**, Gibbes.

One specimen (dredged) which agrees well with Gibbes' description (Proc. Amer. Assoc., 1850, p. 196), and seems to indicate that the species is distinct from *Alpheus minus*, with which it is united by Kingsley. The specimen is larger than any of the individuals of *A. minus*, and is also differently colored, although appearing identical in alcohol.

**Palæmonella tenuipes**, Dana.

Several specimens dredged off Shelly Bay, which agree perfectly with the species described by Dana from the Sooloo Sea (U. S. Exploring Expedition, Crustacea, p. 582). The remarkable distribution here indicated induced me to make a very careful examination of the Bermudian species, which has left no doubt in my mind as to the identity of the forms from the antipodal region of the earth's surface. The only other known species of *Palæmonella*, *P. orientalis* (Dana), is likewise an inhabitant of the Sooloo Sea (Dana, *op. cit.*; Spence Bate, Challenger Reports, Zoology, XXIV, p. 786).

**Palæmon affinis**, Milne-Edwards.

Numerous specimens from shallow water, Castle Harbor. All are exactly like one another, except in the number of teeth on the beak, which may be 8 above and 4 below, or in the relations of 8-3, 7-3, 9-3, and 9-4. This character is manifestly a very variable one, and, therefore, of little or no value from a classificatory point of view. The specimens agree well with the descriptions and figures of *A. affinis*, although that species has hitherto been recorded, as far as I am aware, only from the Pacific (obtained by Dana off New Zealand). The species is near to the Eurafrian *P. squilla*, but yet sufficiently distinct to permit of ready recognition as only an allied form.

It is remarkable, in view of the distribution and the number of specimens that we obtained of this species, and the position of the island group, that we should have failed to obtain any individuals

of the common form of the eastern United States, *Palæmon vulgaris*. Whether the species is entirely absent or not I cannot of course say, but it is surprising that it should not have been observed by us.

*Penæus velutinus*, Dana.

One specimen, which agrees with the figure and description of the species obtained by Dana off the Sandwich Islands (U. S. Exploring Expedition, Crustacea, p. 604), and which was subsequently collected by the Challenger party at various points in the Pacific, and between Australia and New Guinea (Challenger Reports, Zoology, XXIV, p. 253). This species, as well as all the immediately related forms, has, as far as I know, been found thus far only in the Pacific. The case is, therefore, another example of remarkable geographical distribution.

#### STOMATOPODA.

*Gonodactylus chiragra*, Latr.

One specimen from the beach of Flatts Village.

#### MOLLUSCA.

The enumeration of species of molluscous animals is left for a future paper, as our collections, large as they are, are doubtless in great part deficient. Through the kind energies of local collectors I hope to supplement at an early day the material obtained by us, and to present, as nearly as is possible, a full list of the species inhabiting the Bermudian waters. We ourselves collected some 110 or 120 marine species, which is largely in excess of the number that has thus far been chronicled in any list of Bermudian species, but the examination of private collections in the islands satisfies me that there must be an additional 30 or 40 species, or more, that are common to the island group.

It is a well-known fact that the Bermudian molluscan fauna is distinctly, and it might be said, overwhelmingly Antillean in character, by far the greater number of species being found in the Bahaman and West Indian Seas, or along some part of the coast of Florida. The practically total absence of species of the Eastern United States which are not found in the Floridian waters is astonishing, and shows how insuperable is the barrier which the waters of the Atlantic, and of the Gulf Stream particularly, offer to a free migration or dispersion of the species. This, again, appears the more remarkable in the light of certain anomalies of distribution which a critical examination of the species reveals, and which had already

in many cases been noted as a characteristic of the West Indian fauna. Thus, of the various species of Triton, *Triton chlorostoma* and *T. tuberosus* are members of the Mauritian fauna, and *Triton cynocephalus* and *T. pileare* of the fauna of the Philippines; *Ranella cruentata* crops up in the variety *R. rhodostoma*, from Mauritius. Again, *Epidromus concinnus*, from the Philippines, is represented in our collections by a number of individuals which are absolutely undistinguishable, both in shell ornamentation and color-markings, from the Pacific specimens, although they differ somewhat from the closely related *E. Swifti*, from Antigua. A number of other forms, common to the west coast of Africa and to the southern waters of Europe, also occur. Among a number of American west coast species which, I believe, have not hitherto been recorded from the Atlantic may be mentioned *Chama exogyra* and *Tellina Gouldii*, both from the Californian coast. In the case of both of these forms I have very carefully satisfied myself as to absolute identity. *Arca solida* from the west coast does not appear to differ measurably from *A. Adamsii*, a West Indian form which has its representative in the Bermudian fauna.

The following notes on new species are given in advance of the publication of the full list.

### CEPHALOPODA.

Cuttle-fishes are said to be abundant in the Bermudian waters, but we were not very successful in our search after these animals. Two moderately large octopods, which we could only see, but not obtain, may possibly be the common West Indian *Octopus vulgaris*, or one of the forms that have been separated off from it as a distinct species. We made considerable efforts to capture one of these, but all our attempts to dislodge the creature from its hold upon the interior of a rock crevice were unavailing. The following species was obtained beneath a stone on the beach of Flatts Village.

*Octopus chromatus*, n. sp. (Pl. 16, fig. 1.)

Body spheroidal, somewhat acuminate behind, and impressed, but not furrowed, ventrally; mantle opening extending about one-half around the circumference of the body, and terminating some distance below and back of the eyes. The head not much narrower than the body; eyes not conspicuous, with a wart above each; funnel largely free, reaching about half way to the base of the web, which is about as long as the body and head combined.

Arms longest as 1. 3. 2. 4, although possibly the second pair outmeasured the third pair previous to contraction; slender, very tapering, and exceedingly attenuated toward the apex; suckers fairly large, closely placed, and in regular zigzag alternation from the base, contracting with a quadrangular outline.

Body granulated posteriorly, and to a less extent in the region of the neck. Color milky, closely blotched or speckled with ochre, giving a yellowish appearance, and sprinkled with brown.

Length of specimen about nine or ten inches.

The only form with which I can closely compare this species is the *Octopus Bermudensis* of Hoyle (Challenger Reports, Zoology, XVI, p. 94, Pl. II, fig. 5), which is described from a single young specimen, measuring, including the arms, not more than two and a-half or three inches. It differs from this form in the extremely tapering and attenuated arms, their relative lengths (1. 3. 2. 4 instead 1. 2. 3. 4), and in the disposition of the acetabula, which are in zigzag alternation from first almost to last; the body is also in part granulated, and the siphon, instead of being attached for nearly its full length, is largely free.

I should have hesitated perhaps in describing this as a new species, distinct from *O. Bermudensis*, and preferred supposing that the characters indicated by Hoyle were not very clearly marked, or that they possibly represented only the immature form, but Hoyle distinctly states that while his specimen is probably immature, the characters are so well marked as to safely permit of their recognition as typical of a new species (*op. cit.*, p. 95).

### GASTEROPODA.

**Aplysia æquorea**, n. sp. (Pl. 16, figs. 2, 2a, 2b).

Body broadly oval, with a moderately elongated neck; tentacles cylindrical, slit at the extremity; buccal lobes broad, infolded; mouth between fairly developed lips; aperture to opercular cavity on a slightly raised papilla.

Color drab or greenish; exterior surface with thin black annulations and irregular markings, which are few and scattered; the inside of the mantle-lobes, as well as the cover to the opercular cavity, almost free of blotches.

Shell narrowly-elongate, somewhat oblique, and calcareously lined; longitudinally radiated, and transversely finely striated.

Length of animal about four and a-half inches.

A single specimen, found in shallow water on the south side of Castle Harbor, opposite Tucker's Town.

The nearest ally of this species is probably the *Aplysia ocellata* of D'Orbigny, from the Canary Islands, or the common *A. dactylomela*, from the eastern Atlantic, of which the former is by some authors considered to be only a local variety (Rochebrune, *Nouvelles Archives du Muséum*, 1881, p. 264). From both of these forms, apart from other characters, it differs in the absence of the heavy ocellation, and from *A. dactylomela* in lacking the purple lining on the mantle margins. From *A. ocellata*, again, it is clearly marked off by the non-maculated surface of the interior of the mantle lobes and of the opercular covering. The shell in the Bermudian form is comparatively narrower than in any other large species of *Aplysia* with which I am acquainted, and wholly different in outline from that of either of the two species above referred to. I have fully satisfied myself on this point through an examination not only of the figures furnished by Rang and D'Orbigny, but of actual specimens.

Dobson, in a communication made before the Linnæan Society of London (*Journ. Linn. Soc., Zoology*, xv, p. 159, *et seq.*, 1881), identifies a specimen of *Aplysia* from the Bermudas with the *A. dactylomela*, and describes the color as being "a rich drab, marked all over with circles and streaks of velvet black, the latter most abundant on the mantle covering the shell and on the lateral swimming lobes. The shell agrees in all respects with that of *A. dactylomela* as figured by Rang, and the only difference observable is that the margins of the swimming lobes are not tinged with violet. This might be accounted for by supposing that such a fugitive color had disappeared in the alcohol, but the captor does not remember to have seen it in the living animal." This may be the true *A. dactylomela* or *A. ocellata*, but it is, doubtless, distinct from the species above described. I am confirmed in this supposition by the examination of a specimen recently collected by Prof. Dolley in the Bahamas, and which has been placed in my hands through the kindness of Prof. Leidy. This Bahaman form has the massive ocellation and blotching distinctive of *A. ocellata* or *A. dactylomela*, and further agrees with these two species (or varieties) in the form of the shell. The stellate opening to the opercular cavity appears to be destitute of a papilla. This is the form, probably, that Mr. Dobson received through Surgeon R. Vacy Ash.

Deshayes described some years ago an *Aplysia*, ocellated and of a yellowish color, from Guadeloupe (*Journal de Conchyliologie*, 2d. ser., ii, p. 140) under the name of *Aplysia Schrammii*, but the species is

so imperfectly characterized that it is almost impossible to determine its exact relationships.

*Chromodoris zebra*, n. sp. (Pl. 16, figs. 3, 3a.)

Animal of the form typical of the genus; head portion considerably extended and expanded in motion; caudal portion moderately elongated; base flattened; mantle beaded immediately over the tail.

Color bright blue above, variously lined and streaked with light yellow; on the dorsal surface the yellow markings are disposed in longitudinal wavy or nearly straight lines, one or more specially prominent lines along the dorso-lateral border. Sides of animal irregularly reticulated or angulated with yellow markings; under surface pale blue, bordered with faint yellow.

Rhinophores deep indigo or black, the rhinophoral aperture bordered with yellow; gills 12 or 13, black, bordered with yellow, and carrying blue cilia; under surface of head blue, with yellow spots.

Length, when expanded, three and a-half inches.

Three specimens, dredged in about ten fathoms on the north side of Harrington Sound. I dissected one of these and found that the stomach is lodged entirely within the mass of the liver. The alimentary canal is sharply deflected forward (dorsally) beyond the buccal or œsophageal tracts, and is caught up in a nerve ring proceeding from the supra-œsophageal ganglia.

This species appears to be third or fourth of the genus found in the western Atlantic. It differs clearly from the *C. picturata* of Mörch (*C. Mörchii*, Bergh, *Mus. Godef.*, part xiv) and *C. gonatophora* of Bergh, two West Indian species. In the scheme of coloring the species appears to be nearest to *Doris pulcherrima* of Cantraine (*Malacologie Méditerranéenne*, p. 57, Pl. 3, fig. 6, = *D. Villafranca?* of Risso), from which, however, it differs in a number of details, such as the number of gills, etc.

*Onchidium (Onchidiella) trans-Atlanticum*, n. sp. (Pl. 16, figs. 4, 4a.)

Body convex, smoke color or dark olive; lighter, dirty or greyish green on the under surface; pedal disk considerably more than one-third the width of base, yellowish green; mouth margin papillose, bunched; under surface obscurely or obsoletely tuberculose; dorsal surface closely verrucose, with finer granules interspersed between the warts.

Anal aperture immediately beyond the extremity of foot, infra-marginal to a raised border; respiratory orifice between the anal pore and the apex of body.

Length about three-quarters of an inch.

About a dozen specimens, found in a rock hollow on the north shore just beyond Wistowe, near Flatts Village, at an elevation of about two feet above the water.

This is, as far as I am aware, the only species of *Onchidium* that has thus far been recorded from the western Atlantic. Its occurrence is, therefore, of considerable interest as bearing upon the subject of geographical distribution. Nearly all the species of the genus are confined to the Eurafrian and Indo-Pacific waters, although one species is known from Arctic America, one from the Californian coast, and one from the west coast of South America (Bergh, in Semper's *Reisen im Archipel d. Philippinen*, Land Mollusks, VI).

The Bermudian species appear to be most nearly related to *O. Carpenteri*, from the Californian coast, but differs from it in color. The positions of the anal and respiratory apertures differ from what is indicated by Stearns (Proc. Acad. Nat. Sci., Phila., 1878) to exist in the west American form, although agreeing with the determinations made by Bergh for manifestly the same species.